12.
NGĀ ROTO TĀPOKAPOKA – TE HIKU O TE IKA DUNE LAKES RESTORATION

WAIKARERE GREGORY (TE RARAWA, TE AUPŌURI, NGĀTI KAHU, NGĀPUHI, NGĀI TAHU), JOANNE MURRAY (TE RARAWA, NGĀTI HINE, NGĀPUHI), WENDY HENWOOD (TE RARAWA)

Te rākau taumatua, he karahuinga manu

It is said that a tree of many years is a gathering place for many birds

Waihoki, te roto tāpokopoko, he wai whakahuihui, he pūkenga ora

Likewise, a dune lake is like an oasis that brings together and grows life

Anaru Reiper (Te Aupōuri)

He mihi tēnei ki a koutou katoa i āwhina, i tautokohia te mahi nui nei.

Ko koutou tēnā o Te Hiku Iwi Development Trust, Manatū Mō Te Taiao (MfE), Te Papa Atawhai (DOC), Te Kaunihera ā Rohe o Te Taitokerau (Northland Regional Council), Te Aho Tū Roa me Enviroschools (Toimata Foundation), Whāriki Research Group (Te Kunenga ki Pūrehuroa – Massey University), Taihoro Nukurangi (NIWA), ko ngā mema o te rōpū Project Advisory, Sweetwater Farms JV, Northtec, Te Matarau, Rawhitiroa Photography, Reconnecting Northland. Ko ngā mahinga tipu – ko Waikura Landscaping Services, ko Bushland Trust, ko Tuia Maara Whenua, ko Ngāi Takoto ki Waimanoni, ko ngā marae o Te Hiku, ko ngā iwi o Te Aupōuri, Ngāi Takoto, Te Rarawa.

He mihi aroha hoki ki te tini anō o ngā whanaunga, ngā marae, ngā kaitūao, e mahi tahi ana mō te kaupapa nei, kia whai oranga te taiao, a, ko tātou anō te tangata me ngā uri whakaheke. Na, kia tuku iho tonu i ngā taonga maha nō ngā tūpuna.

Nā reira, tēnā koutou, tēnā koutou, tēnā tātou katoa.

– Ngā mihi, nā Waikarere mātou ko Joanne, ko Wendy

ABOUT DUNE LAKES

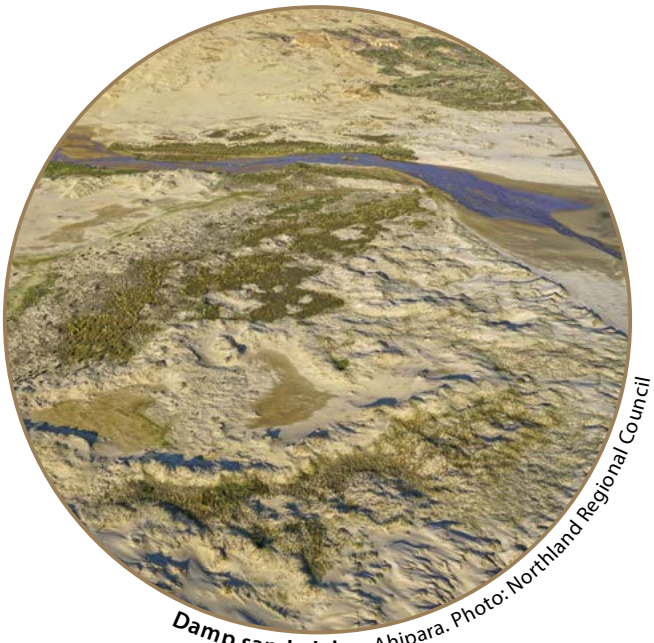
Dune lakes are of regional, national, and international ecological significance. Described as rare and unusual because they are found in few places in the world, dune lakes are formed by the actions of sand, wind, and water in high rainfall regions. Te Tai Tokerau (Northland) Aotearoa New Zealand, has approximately 200 dune lakes greater than 0.5 ha in size. No other region in Aotearoa approaches this number, with indications that Te Tai Tokerau may also top the number of dune lakes internationally. There are six different types of dune lakes and all are quite different, varying in size, depth, water chemistry, and underwater species.

Previous page: Dune slacks, Ahipara.
Photo: Northland Regional Council

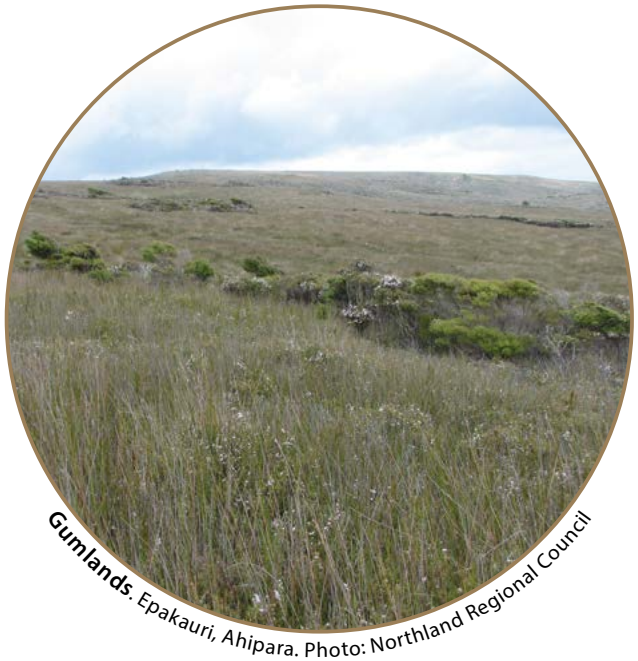
Aerial view of Lake Onepū. Photo: © Rawhitiroa Photography

Due to the regularly shifting nature of our coastlines and the variable fertility found in their soils, dune lakes exist alongside examples of some of the most dynamic wetland types, which include palustrine systems like marshes and swamps. Other unique wetland types found around dune systems include:

- **Gumlands:** seasonally wet shrublands found only in Northern Aotearoa, concentrated around Kaitaia and Kaikohe. They are more commonly known for the kauri gum (fossilised resin extracted from kauri trees) found in them. Gumlands provide important habitat for native moths and butterflies, in addition to a range of highly threatened and endangered fish, plant, and bird species.

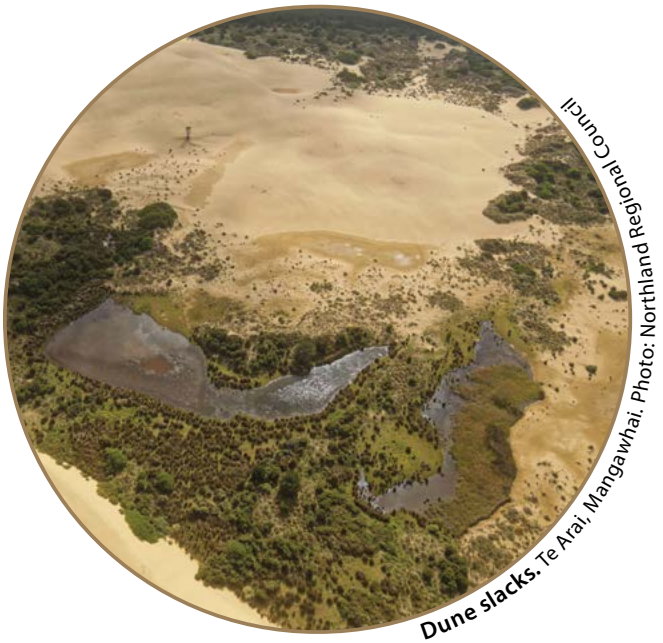


Damp sand plains. Ahipara. Photo: Northland Regional Council



Gumlands. Epakauri, Ahipara. Photo: Northland Regional Council

- **Damp sand plains:** flatter areas of dunes where the wind has gradually removed the sand over many years. Because they have permanent water (above or below the surface), the remaining sand is stabilised, preventing further erosion. In Te Tai Tokerau these were among the first dune wetland types to be converted for human land use and activities, and are some of the most threatened wetland types.
- **Dune slacks:** small depressions between shore dunes or in sandbanks. These were once widespread across the country, including offshore islands like Rakiura (Stewart Island), Southland Aotearoa. Dune slacks (also called dune swales or dune hollows) trap water and nutrients, giving life to some incredible coastal and aquatic plant diversity. Sadly, very few remain in Te Tai Tokerau because of land use intensification.



Dune slacks. Te Arai, Mangawhai. Photo: Northland Regional Council

THE CULTURAL DUNESCAPE OF TE HIKU O TE IKA
TOHU O TE WHENUA, TOHU O TE RANGI, TOHU O TE MOANA

There are approximately 50 dune lakes located in Te Hiku o Te Ika (Fig. 1) and these are of great cultural and environmental significance to the five northern iwi (tribes) of Ngāti Kuri, Te Aupōuri, Ngāti Kahu, Ngāi Takoto, and Te Rarawa. Regarded as taonga (culturally important), they are home to a wide range of species, and are important resources for kai (food); cultural materials such as rongoā Māori (traditional medicine) and raranga (weaving) with kiekie (giegie bush), nīkau, houhere (lacebark); kauri and tōtara for building waka (canoes); kiekie roots for binding; storage for clean water and recreational activities. They also sustain stories that connect to ngā tūpuna (our ancestors). Pūrākau (traditional stories) refer to the lake sites as markers of historical events; of settlements; of tracks that linked hapū (sub-tribes) and iwi; of expressions of whakapapa (connection) to te taiao (natural world); and of tohu (signs) to note and act on – tohu o te whenua (signs from the land), tohu o te rangi (signs from celestial bodies), tohu o te moana (signs from the sea).

Many stories are told of the abundance of kai – lush gardens of taro (root vegetable) thrived on the wet fertile lake edges, with kūmara (sweet potato) further out. Lake Tāngonge is known for its flooding and fluctuations in water levels, and local whānau (families) and hapū would journey to the lake edges to gather kai in season. During the tuna heke (downstream eel migration) and when the karaka (NZ laurel) berries were ripe, locals spent days camped out to gather and process the kai before returning home stocked up for the months ahead.

Mānuka (NZ tea tree) are noted in our stories: they grew alongside waterway banks and were used to replace the kaho (battens) in the bottom of waka. Kaimahi (workers) would bend a mānuka branch into the stream, on returning sometime later they'd pull the branch out and it would be laden with kēwai (freshwater crayfish) ready to be thrown into boiling water for a kai. Mānuka was also used as rākau rongoā (traditional medicinal plant) due to its antiseptic qualities and multitude of health benefits for skin, wounds, bruises, and stomach ailments.

Ka moe a Tāne i a Tawake-toro kia puta ko Mānuka

Tāne married Tawake-toro and begat Mānuka

We continue to acknowledge the importance of whakapapa (genealogy) and the tapu (sacred) nature of the rākau (tree) as we call upon Te Urutapu o Tāne (the sacred realm of Tāne) to bring about wellness to us – te ira tangata (humankind). Mānuka was one of the rākau rongoā included as part of the riparian planting plan around our dune lakes.

Lake Waiparera. Photo: Wendy Henwood

Figure 1. Location of some of the major lakes of Te Hiku, Te Tai Tokerau, Northland. Source: Northland Regional Council

THE STATE OF THE LAKES TODAY

While dune lakes are a key feature of our cultural landscape, they struggle as a result of colonisation and alienation, environmental modification (including wetland drainage), and exploitative land-use practices. The degradation of the once rich, diverse, and productive ecosystems compromises the ecological integrity of entire catchments: water flows radically change, diversity is diminished, species of high cultural and environmental value are depleted and, in some instances, lost. Kaitiakitanga (exercise of guardianship) practices based on profound local knowledge has been eroded with the loss of mātauranga Māori (Māori knowledge) in relation to species, water, and landforms, and their interconnection with the people. Mahinga kai (cultivated foods) have been damaged and food production harmed, undermining the economic, cultural, and spiritual self-sufficiency of Te Hiku communities.

As a result of past action or inaction, the lakes are now nutrient-enriched, with sparse marginal vegetation providing little protection against run-off. Exotic invasive plants and fish are transferred between the lakes by recreational activities via nets and gear. Fish species now include gambusia (mosquito fish) and goldfish, along with pest plants such as hornwort, oxygen weed, and egeria (Brazilian waterweed). Invasive plants choke native species, resulting in frequent toxic blue-green (cyanobacteria) algal blooms that some native fish species cannot survive. Other land-based invasive plants identified include tobacco weed, privet, and elephant grass.

Lake Tāngonge

Lake Tāngonge derives its name from the effect of taro leaves undulating/rippling in the wind. Evidence of rua (storage pits) still exist there today. It once sat in the bowl below what is now Kaitaia, Pukepoto, and the sandhills of the west coast. Draining of the lake occurred in the 1920s as part of a Government settlement scheme to create land for farming. Clearance of bush upstream and changes to land practices create long-standing suffering for mana whenua (Indigenous people with primary rights and responsibilities over an area), due to the loss of kai and resultant lifestyle changes. This has huge long-term impacts on our spiritual and physical health and well-being, disconnecting us from the whenua (land) and wai (water) that is us, and to which we belong.

Draining Lake Tāngonge 1922. Photos: Museum at Te Ahu, Kaitaia

MOTIVATION FOR ACTION

Increasingly, whānau, hapū, and iwi have shown interest in and commitment to kaitiakitanga and learning more about our local environments. The release of the Waitangi Tribunal Wai 262 claim report 2011, and the Te Hiku Treaty Settlements 2015 included two innovative environmental cultural redress mechanisms. These brought a determination to take action and assert rangatiratanga (right to exercise authority) over our whenua, namely, shared governance over:

I. Te-Oneroa-Ā-Tōhē
II. The conservation estate – Te Korowai for enhanced conservation

Te Korowai refers to the cloak of protection provided by Te Hiku iwi as kaitiaki of the whenua and taonga (roto and repo). Mahi (work) underway on Lake Tāngonge also provided guidance for how we could model our restoration plans for other lakes.

Three Te Hiku iwi – Te Aupōuri, Ngāi Takoto, and Te Rarawa, pulled together to start a long-term programme of restoration of the lakes within the rohe.

The aims were to:

I. increase skills and knowledge
II. improve the lake environments in ways that would:
    - uplift the people
    - strengthen iwi cultural connections
    - connect and reconnect whānau with their roto (lake) and repo (wetland) resources
    - demonstrate kaitiakitanga practices and rangatiratanga over our natural resources in the post-settlement era.

The programme is built on the respective iwi mana whenua vision for sustainable community-led restoration of these taonga (treasures). At the same time local skills are built that align with current employment opportunities while strengthening the long-term wellness of the whānau.

Our lakes are home to a wide range of native plants and animals and are among the most threatened and rare aquatic habitats in the world. Species associated with the mauri (life force) of these environments, indicating healthy ecosystems, include those depicted in Table 1 and Figure 2. The surrounding kuta (giant spike sedge) and raupō (bulrush) beds, harvested for raranga materials, are home to many native fish and water birds.

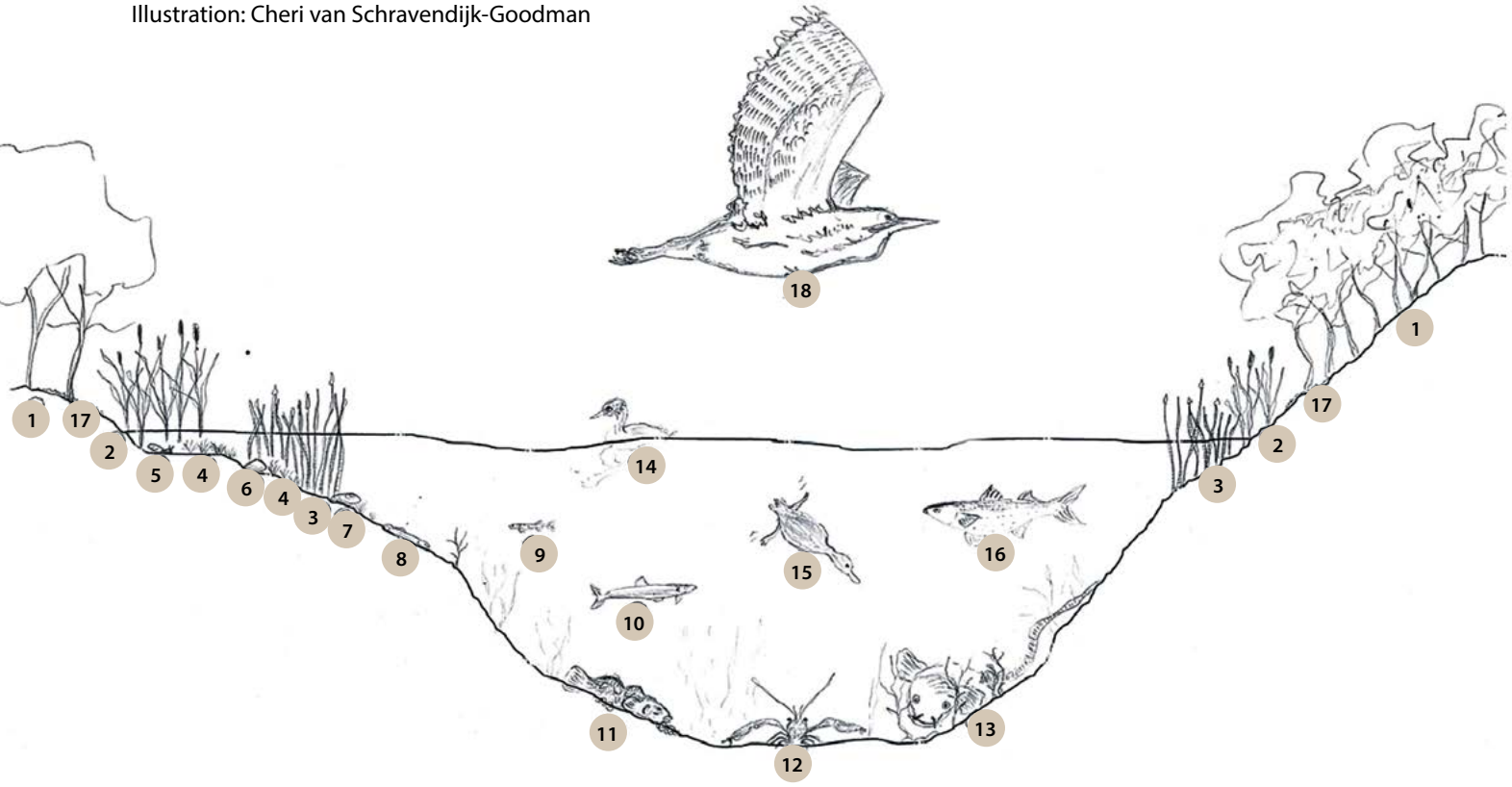
Kaitiakitanga at work – community support for the lake environments, Te Hiku schools planting day, Lake Onepū. Photo: © Rawhitiroa Photography

Table 1. Native plants and animals associated with the mauri of Te Hiku o Te Ika dune lake ecosystems

No.	Species names known to Te Hiku iwi	Common and scientific name	Species Type and Conservation Status
1	Mānuka	*Leptospermum scoparium*	Shrub At risk-declining
2	Raupō	Bulrush, *Typha orientalis*	Wetland plant
3	Kuta	Giant spike sedge, *Eleocharis sphacelata*	Wetland plant
4	**	*Trithuria inconspicua*	Aquatic plant Nationally critical
5	Karahū	Mud snail, *Potamopyrgus* spp.	Mollusc
6	Kōkota	Freshwater pipi, *Chione stutchburyi*	Mollusc
7	Kākahi Torewai	Freshwater mussel, *Hyridella menziesi*	Mollusc
8	Hauhau Waikaka	Black mudfish. *Neochanna diversus*	Fish At risk-declining
9	Īnanga	Dune lake dwarf īnanga, *Galaxias gracilis*	Fish At risk-declining
10	Karawaka	Common smelt, *Retropinna retropinna*	Fish
11	Kōkopu	Common bully, *Gobiomorphus cotidianus*	Fish
12	Kēwai	Freshwater crayfish, *Paranephrops planifrons*	Crustacean Locally rare
13	Tuna	Longfin, shortfin eels, *Anguilla* spp.	Fish Longfin, at risk-declining
14	Taihoropī	NZ dabchick, *Poliocephalus rufopectus*	Waterbird At risk-declining
15	Matapō	NZ scaup, *Aythya novaeseelandiae*	Waterbird At risk-declining
16	Kanae	Grey mullet, *Mugil cephalus*	Fish
17	Tapuwae karitehe	Musk, *Mazus radicans*	Ground plant
18	**Matuku	Australasian bittern, *Botaurus poiciloptilus*	Waterbird Nationally critical

Note: **Species that are classified as having 'Threatened' conservation status

Figure 2. Illustration of native plants and animals associated with the mauri of Te Tai Tokerau dune lake ecosystems.
Illustration: Cheri van Schravendijk-Goodman



OUR APPROACH

Our long-term vision to improve the quality of all Te Hiku lake environments

Three lakes – Onepū, Waiparera, me Te Wai O Tikiahi – were prioritised for restoration. With some funding support, a small group of Te Hiku iwi members set about taking an iwi rangatiratanga (iwi direction, leadership, authority) approach that would make a difference for the people and the environments involved (Fig. 3).

One of our first actions was to restore the ancestral names of the lakes – Onepū (previously known as Bulrush Lake) which is part of Te Ārai dunelands, and Te Wai O Tikiahi (previously known as Split Lake).

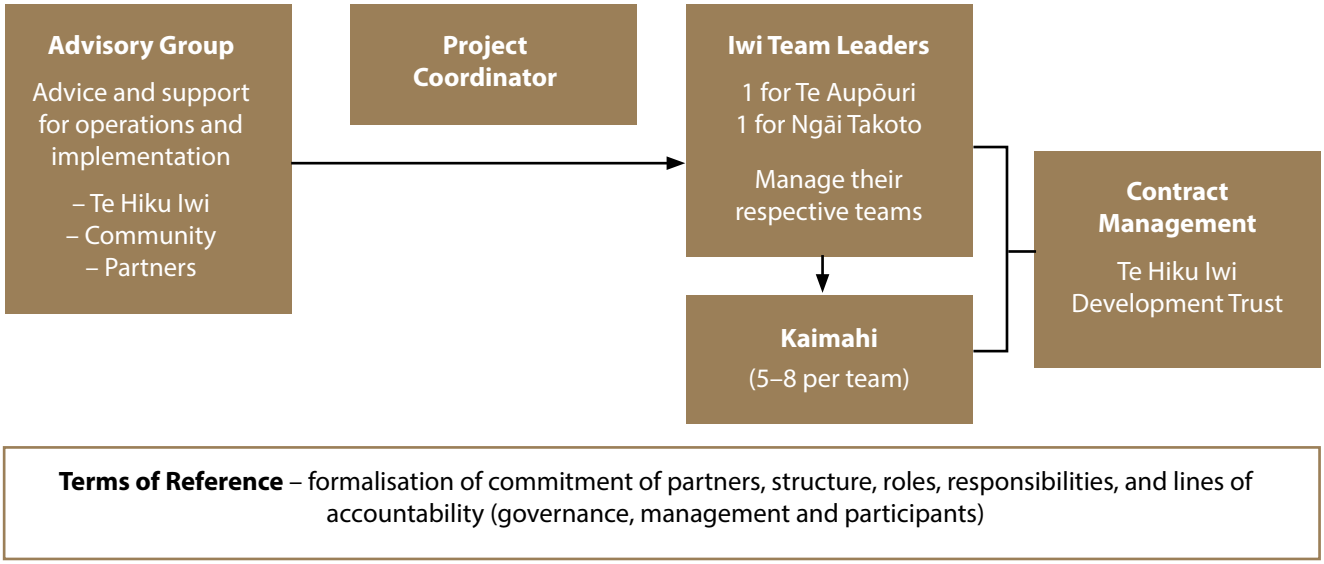


Figure 3. Schematic of Te Hiku iwi project team and structure

Te Wai O Tikiahi. Photo: Wendy Henwood

The project is iwi-led, meaning it is informed by, and supports iwi environmental plans and aspirations. Four interconnected wellbeing pou (pillars) provide a holistic foundation based on shared iwi values and principles (Fig. 4). The environmental focus overarches the framework to ensure the mahi uplifts the people, strengthens iwi cultural identity, and connects whānau with their whenua, roto, and repo – kaitiakitanga in action.

At the core of the plan is building capacity and capability through education, training, and qualifications. It was also a catalyst to prepare a Te Hiku workforce to respond to land-based market needs. The majority of kaimahi recruited had been unemployed for some time. Our programme implemented the following processes:

- Kaimahi enrolled in relevant tertiary studies for 2–3 days per week, and the remaining time involved in hands-on restoration mahi. Studies encouraged whānau to re-engage in learning and to experience the benefit of qualifications that might lead to employment.
- We negotiated fees-free courses to reduce training-related debt for our kaimahi. The project also topped up their income to incentivise and acknowledge their work.
- The majority of kaimahi secured either part-time or full-time employment in local orchards.

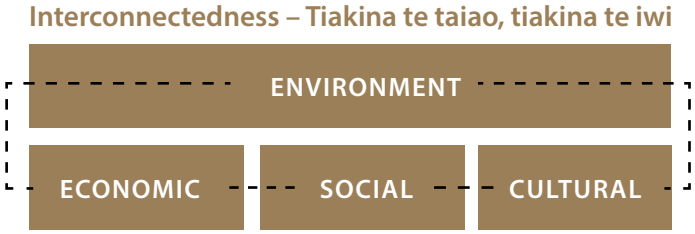


Figure 4. Ngā pou e whā – Four interconnected wellbeing pou

Kaumātua helping out, Te Hiku schools planting day, Lake Onepū. Photo: © Rawhitiroa Photography

Kaitiakitanga at work – community support for the lake environments, Te Hiku schools planting day, Lake Waiparera. Photo: Northern Regional Council

Mahi tahi – Relationships and collaborations

Working together with other groups and projects was key, exposing our kaimahi to a wide range of experiences, expertise, learning, and ideas. In addition to strong mana whenua support and involvement, government agencies, local landowners, local schools, tertiary providers, and community groups also actively participated. Several indigenous and overseas visitors were hosted. Community planting days were also a key feature, with approximately 500 people helping throughout the 2 years. In addition, the team was involved with planting at other Te Hiku lakes and conservation initiatives. This provided valuable sharing, learning, and understanding among people and about places. Although working with a large and diverse group was time consuming and sometimes challenging, it was an essential ingredient of the community project – all had a role to play and added value.

Tamariki participate in tuna monitoring and protection, Lake Onepū. Photo: © Rawhitiroa Photography

Rangatahi taking leadership, Te Hiku schools planting day, Lake Onepū. Photo: © Rawhitiroa Photography

Kaitiakitanga at work – community support for the lake environments, Te Hiku schools planting day, Lake Onepū. Photo: © Rawhitiroa Photography

KEY LEARNINGS

While the aspiration is to use environmental restoration as a catalyst for improving the well-being of Te Hiku, it is unrealistic to expect sustainable outcomes from a 2-year project or from stop-start approaches.

Some issues were challenging and beyond our control:

- Lack of funder understanding of our holistic thinking and the four pou approach
- Short-term funding for long-term issues prevents project development
- Short-term strategies and a lack of appropriate training courses to maintain enthusiasm and purpose led to a degree of kaimahi disengagement. This also hindered building on shared learning to feed into the project.

Whānau getting wet for the tuna survey, Lake Waiparera.
Photo: Wendy Henwood

Whānau ready for the tuna survey, Lake Onepū.
Photo: Wendy Henwood

Key Benefits – Hands-on restoration mahi

Action plans have been developed for each lake. Below are some of the key actions undertaken:

- Nearly 5000 metres of riparian fencing around the three lakes
- Approximately four and a half hectares of the lake margins were planted with a mix of eco-sourced native species – mānuka, kānuka, tī kōuka (cabbage tree), and harakeke (NZ flax) – to create a buffer beside farms and plantation forests
- Fenced and planted areas were the focus for pest animal trapping. Training was sourced locally
- Invasive plant species were identified and removed
- Seasonal monitoring used adaptations of the stream health monitoring and assessment kit (SHMAK) and cultural health indicators (CHI) model. Observation and use of our senses were key monitoring elements to track change over time
- A tuna (freshwater eels) survey was carried out with NIWA in which 236 tuna were caught across the three lakes. Recording data from the catch (weight, length, species, health) gave an indication of abundance and distribution. Twenty-five otolith (ear stone) bones were removed and sent to the laboratory for ageing to provide further information about the state of the fish stock
- Kaimahi development by qualifications and experience gained through the project triggered a new interest in working on and caring for the land.

Tamariki leading water quality monitoring using the water clarity tube from the SHMAK, Lake Onepū.
Photo: © Rawhitiroa Photography

Key Benefits – Local environments as places of learning

- The maramataka Māori (cultural lunar calendar) influenced when we planned and implemented our mahi. This ensured the higher energy days were optimised for learning and the time when the gravitational pull is highest for drawing water from within Papatūānuku (Earth mother) was optimised for planting
- A better understanding of the importance of the dune lake ecosystems, and kaitiakitanga roles and responsibilities, created motivation to participate in environmental restoration. The increased knowledge of local environmental issues, plant species and planting, water quality monitoring, and pest control, was passed on to whānau and communities
- Regular wānanga (workshops) and community planting days were key to connecting mana whenua and the wider community in practical ways. Community groups and agencies were actively involved in all project activities and were crucial to ensuring that the work started through the project would continue
- Some of the schools involved are now including the local lakes in their own curriculum as places of learning and environmental restoration, promoting intergenerational learning opportunities whilst providing student hands-on action, interaction, engagement, connection, and a true sense of kaitiakitanga for their dunes lakes.

Harvesting kuta by the Tuia Māra Whenua Rōpū Rongoā, at Lake Ngatu, Te Hiku. Photo: Joanne Murray

Pāke kuta (cape made of kuta) woven by Kylie Simeon, made from the kuta harvested at Lake Ngatu, Te Hiku.
Photo: © Erica Sinclair Photography

Tamariki leading water quality monitoring using the SHMAK, Lake Onepū. Photo: © Rawhitiroa Photography

WANT TO LEARN MORE?

Note: If you are having problems with the hyperlinks below try copying and pasting the web address into your browser search bar.

References

Bergin D, Herbert JW 1998. *Pīngao on coastal dunes: Guidelines for seed collection, propagation and establishment. Coastal Dune Vegetation Network Technical Bulletin 1*. Rotorua, New Zealand: New Zealand Forest Research Institute. 20 p.

Bergin D 1999. *Spinifex on coastal sand dunes: Guidelines for seed collection, propagation and establishment. Coastal Dune Vegetation Network Technical Bulletin 2*. Rotorua, New Zealand: New Zealand Forest Research Institute. 8 p.

Champion PD, Reeves PN 2009. *Factors causing dune ephemeral wetlands to be vulnerable to weed invasion*. DOC Research & Development Series 310. Wellington, New Zealand: Department of Conservation. 53 p.

Hilton M, Macauley U, Henderson R 2000. *Inventory of New Zealand's active dunelands. Science for Conservation 157*. Wellington, New Zealand: Department of Conservation. 35 p.

NIWA 2002. *Stream health monitoring and assessment kit. Stream monitoring manual. Version 2K – A tool for Kaitiaki. Technical report 111-1*. Wellington, New Zealand: National Institute of Water and Atmospheric Research. 190 p.

Tipa G, Tierney L 2006. *A cultural health index for streams and waterways: Indicators for recognising and expressing Māori values*. Wellington, New Zealand: Ministry for the Environment. https://www.mfe.govt.nz/sites/default/files/cultural-health-index-for-streams-and-waterways-tech-report-apr06.pdf

Waitangi Tribunal 2011. *Ko Aotearoa tēnei: A report into claims concerning New Zealand law and policy affecting Māori culture and identity (WAI262)*. Wellington, New Zealand: Waitangi Tribunal. https://waitangitribunal.govt.nz/news/ko-aotearoa-tenei-report-on-the-wai-262-claim-released

Useful websites

Te Hiku Dune Lake Restoration

https://tehikudunelakes.wixsite.com/nga-roto-tapokapoka

https://tehikudunelakes.wixsite.com/nga-roto-tapokapoka/nga-panui-news/hidden-gems-videos-northland-dune-lakes

Te Hiku Treaty Settlement 2015

https://www.govt.nz/treaty-settlement-documents/te-rarawa

Toimata Foundation – Te noho taiao o Te Rarawa

https://youtu.be/Cw3z83tcPUU

About the SHMAK

https://niwa.co.nz/our-science/freshwater/tools/shmak/manual/about-kit

Contact details for Wendy Henwood

Email: tirairaka@outlook.com